Year-round migratory connectivity in American Golden-Plover (*Pluvialis dominica*)

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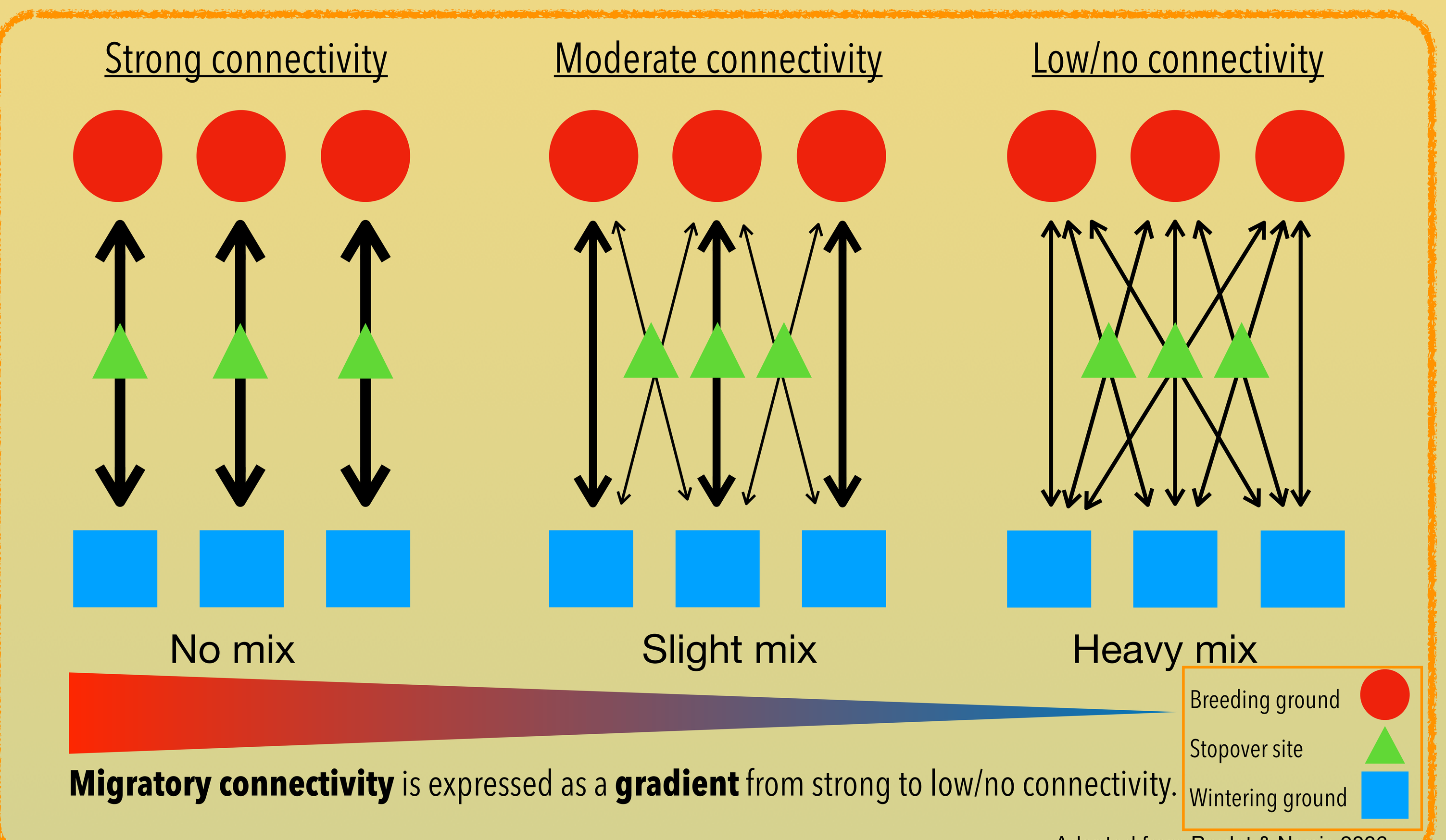
American Golden-Plovers are transequatorial migrants with a wide distribution across the North American Arctic region during the summer and their populations are currently declining.

Introduction

Many species of migratory birds are currently suffering global declines and setting up effective conservation measures requires an understanding of their **migratory connectivity**. Positive or negative events taking place during a certain period will have an impact on a species that is proportional to the level of mixing of population at that given space and time. Although migratory connectivity *per se* can apply to all periods of the annual cycle, most studies have only contrasted the breeding and the wintering locations of individuals.



Migratory connectivity is expressed as a **gradient** from strong to low/no connectivity.

Adapted from Boulet & Norris 2006

Objectives

i) Describe the spatiotemporal use of sites outside the breeding season in arctic-nesting American Golden-Plovers

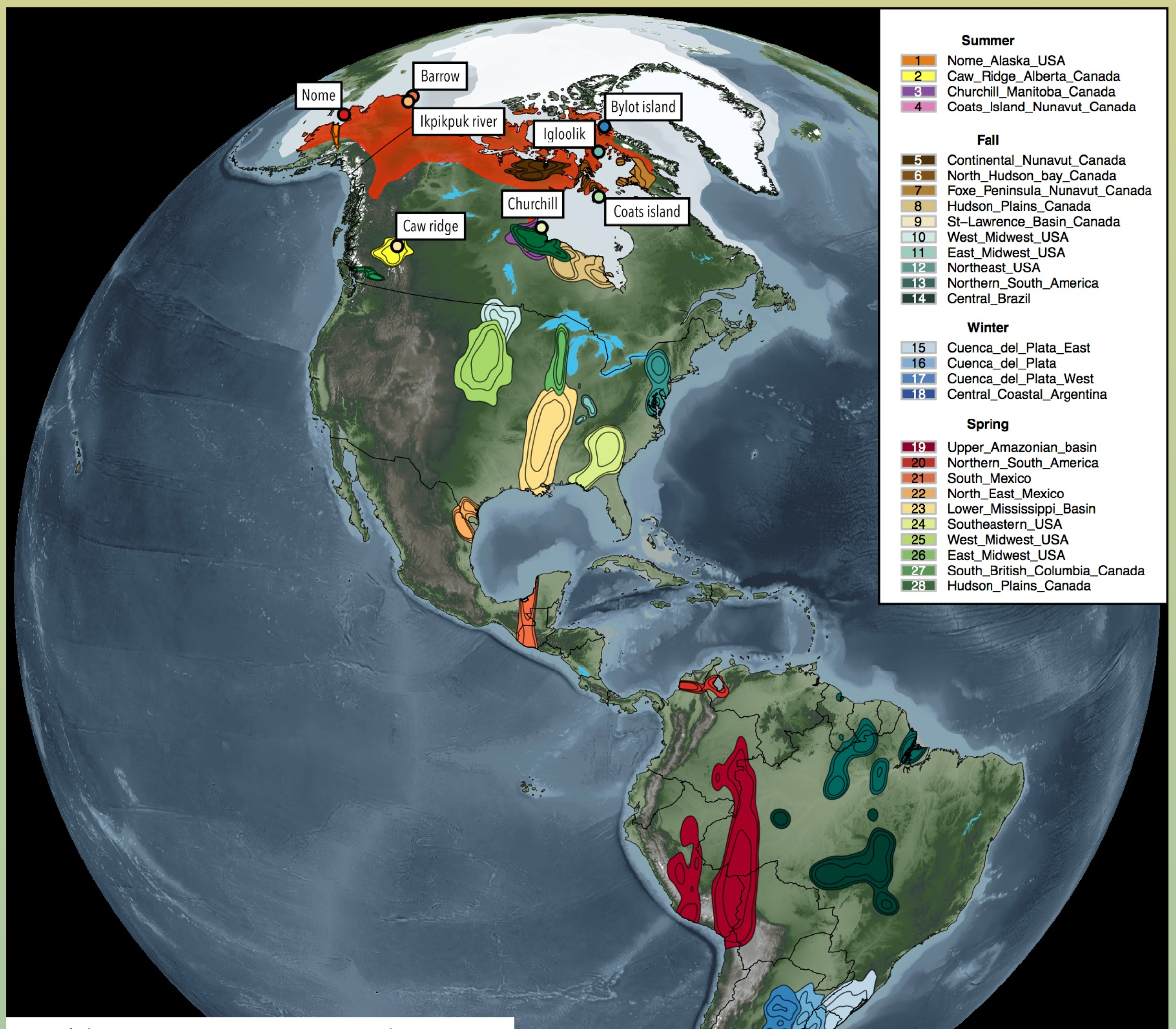
ii) Quantify the range-wide degree of migratory connectivity while taking time into consideration.

Method

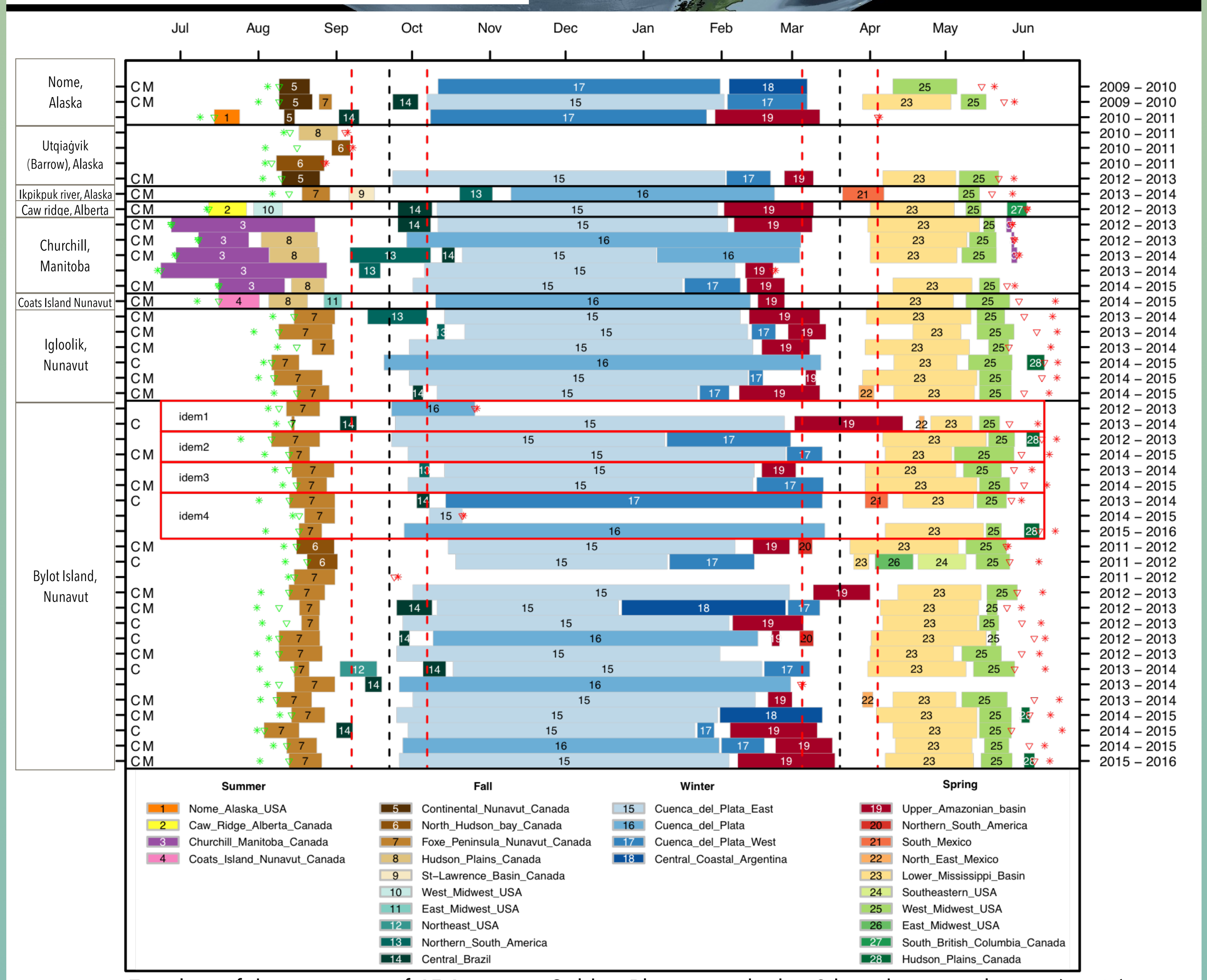
- ➡ From 2009 to 2016.
- ➡ 8 breeding sites covering the entire breeding range of the species.
- ➡ Migratory paths were obtained with light-level loggers – **geolocators**.
- ➡ Sequential Mantel tests were used to quantify the level of migratory connectivity through time.

Results | Discussion

➡ Plovers shared many stopover and non-breeding sites.



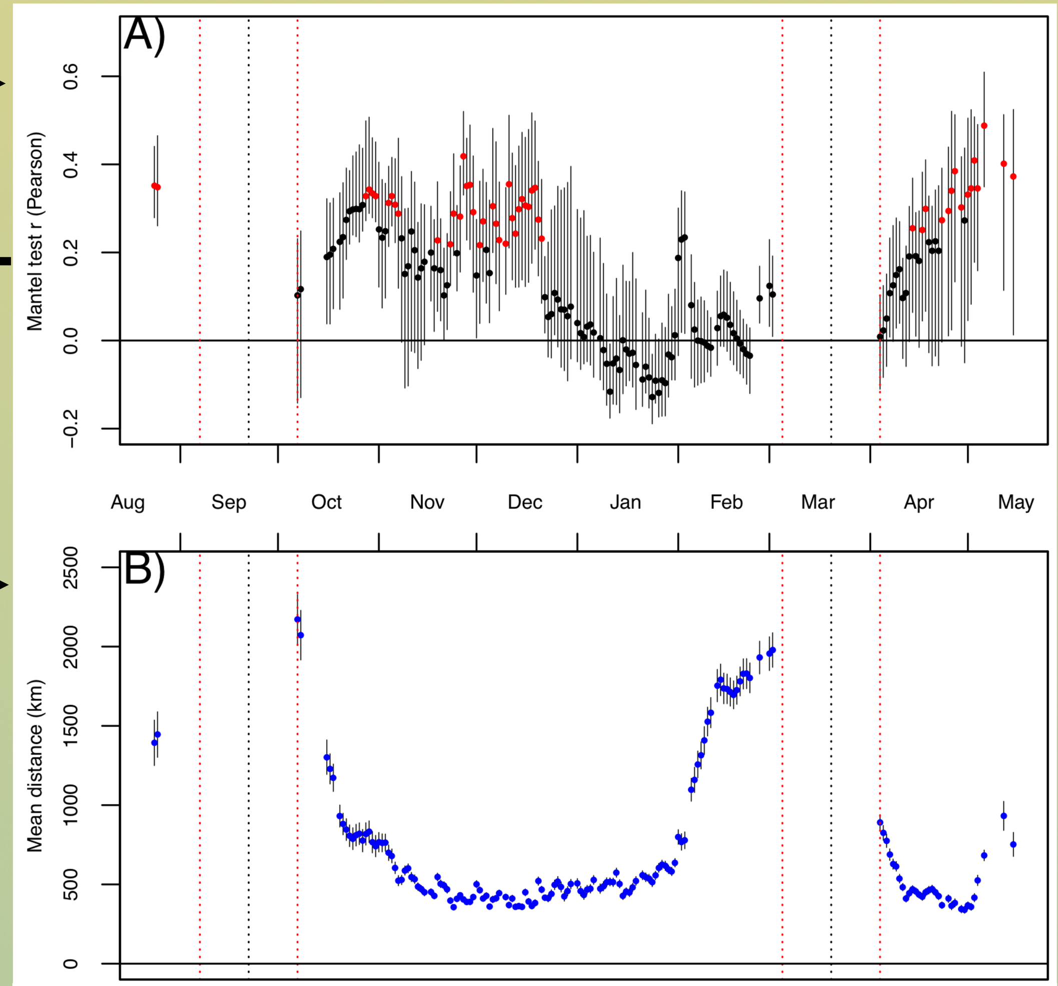
Kernel density estimate (50%, 75% and 90%) for all sites used (n = 45) with land mask.



Timeline of the migration of 45 American Golden-Plovers marked in 8 breeding populations (y axis). Birds used for sequential Mantel tests are indicated with line header « M ».

➡ High inter-population mixing **– relatively low connectivity –** for a significant proportion of the non-breeding period (~70% of the time).

➡ Relatively small spatial scale, with **mean distances between individuals < 1000 km** throughout most of the non-breeding period.



Top: Temporal variation in the Mantel r_M coefficient with lower and upper confidence limit (95%). Dates with significant Mantel tests are in red (999 permutations).
Below: Mean distances between individuals through time (spatial scale) with lower and upper confidence limit (95%).

Based on

- **simulations**
- **literature**

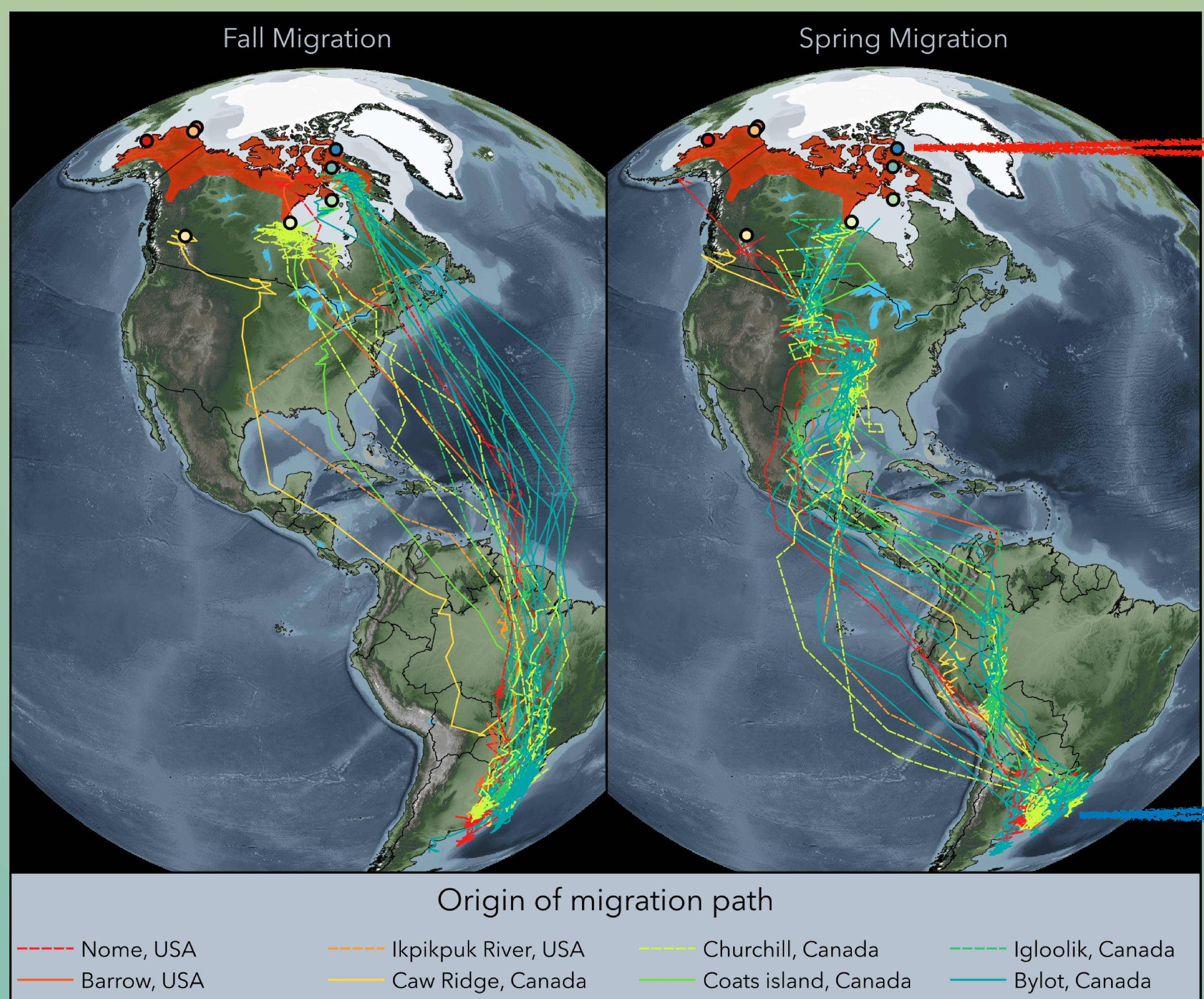
Migratory connectivity

- Strong $r_M > \sim 0.75$
- Moderate $r_M \approx [0.15 \text{ to } 0.5]$
- Low $r_M < \sim 0.1$

Conclusion

➡ Environmental stressors encountered during the non-breeding period could similarly affect plovers nesting in very distinct arctic sites.

➡ Low migratory connectivity raises serious conservation issues and key stopover and wintering sites of arctic birds must be identified and protected to reduce the impact of global change on migrating populations.



Migratory path used in the Mantel analysis (n=25). Breeding range is in red. Southbound migration represents space use before January 1st, whereas northbound migration shows space use thereafter.

American Golden-Plover male nesting on Bylot Island.

American Golden-Plover male (nesting on Bylot Island) seen by José S. Abente on February 23 2013, Southern Uruguay.

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